

(12) UK Patent Application (19) GB (11) 2 273 387 (13) A

(43) Date of A Publication 15.06.1994

(21) Application No 9225401.0

(22) Date of Filing 04.12.1992

(71) Applicant(s)

Knudsen Computer Products Limited

(Incorporated in the United Kingdom)

5 The Tene, BALDOCK, Hertfordshire, SG7 6DG,
United Kingdom

(72) Inventor(s)

Michael Herbert Bail

(74) Agent and/or Address for Service

Britter & Co

Barn West, The Dioxies, High Street, Ashwell,
BALDOCK, Hertfordshire, SG7 5NT, United Kingdom

(51) INT CL⁵

G09B 5/04

(52) UK CL (Edition M)

G5G G6

(56) Documents Cited

GB 2184588 A GB 2029775 A US 4838791 A

(58) Field of Search

UK CL (Edition L) G5G G13 G17 G6

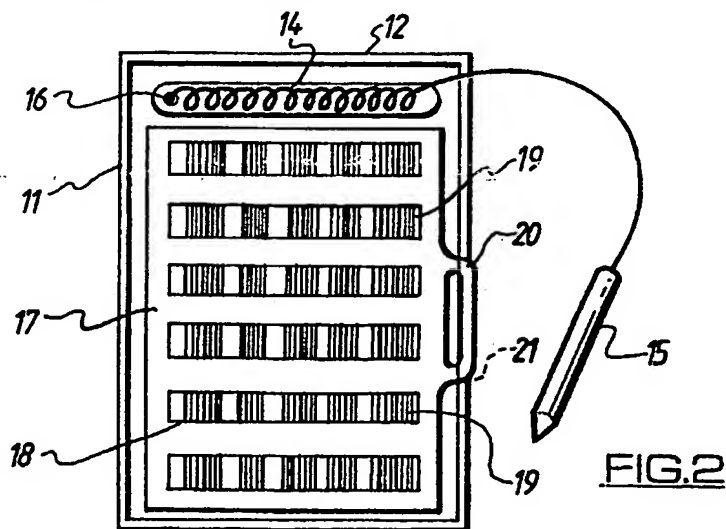
INT CL⁵ G09B 5/04

(54) Reading system for the visually handicapped.

(57) A bar code to speech conversion unit for the blind or partially sighted, comprises a pen-like bar code reader/scanner 15, together with its associated code reading electronics/mechanism;

a shallow tray-like, box-type base 11 to which the reader/scanner 15 is operably linked, which is arranged to support a sheet (31, Figure 3) carrying thereon aligned strips of bar codes and which incorporates the electronics/mechanism for the reader/scanner 15 and the code-to-speech conversion unit and includes a recess 16 for storing the reader/scanner, 15 and its physical linking means, 14; and reader/scanner guide means mountable removably over a bar code sheet (31) when positioned on the base (11), the guide means being in the form of a template and comprising a sheet-like panel, 17 bearing a multiplicity of elongate slots, 18 which are, in use, aligned with and extend along the corresponding bar code sheet code strips and which provide a mechanical guide for the reader/scanner 15 as, in use, it reads/scans the bar code strips therethrough.

The invention also provides a bar-code-to-speech conversion unit suitable for use by the blind or partially sighted during a visit to or contact with a shop or other undertaking for identifying the undertaking's products including any services associated therewith.

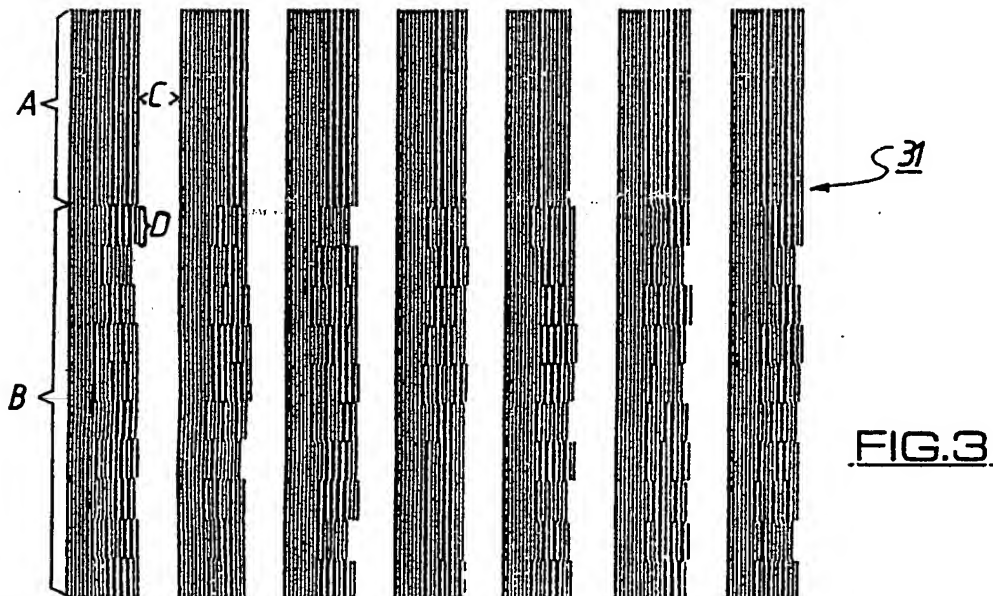
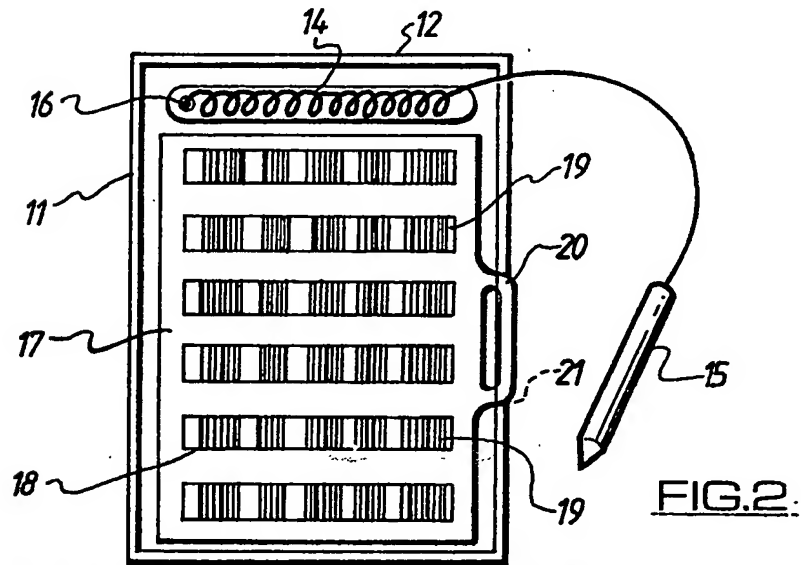
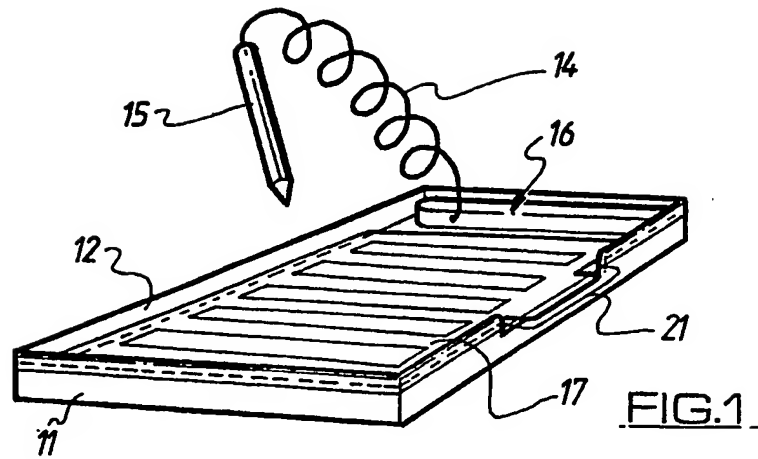


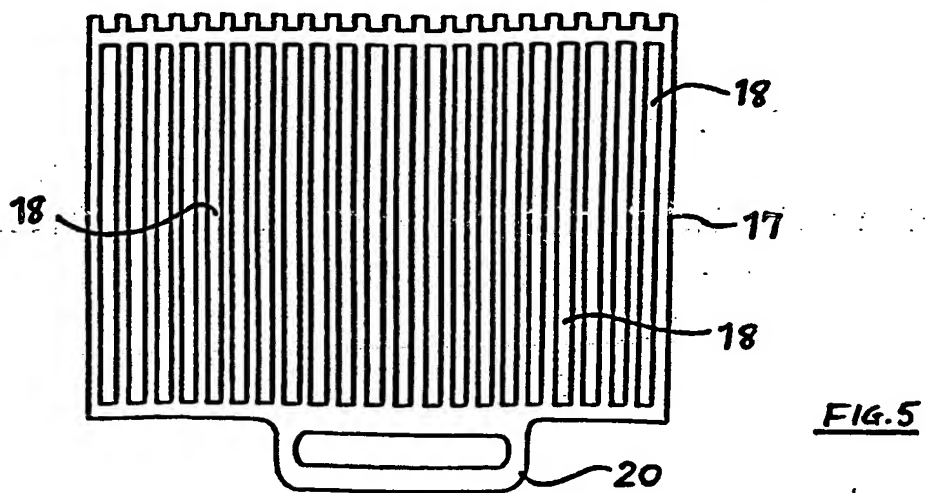
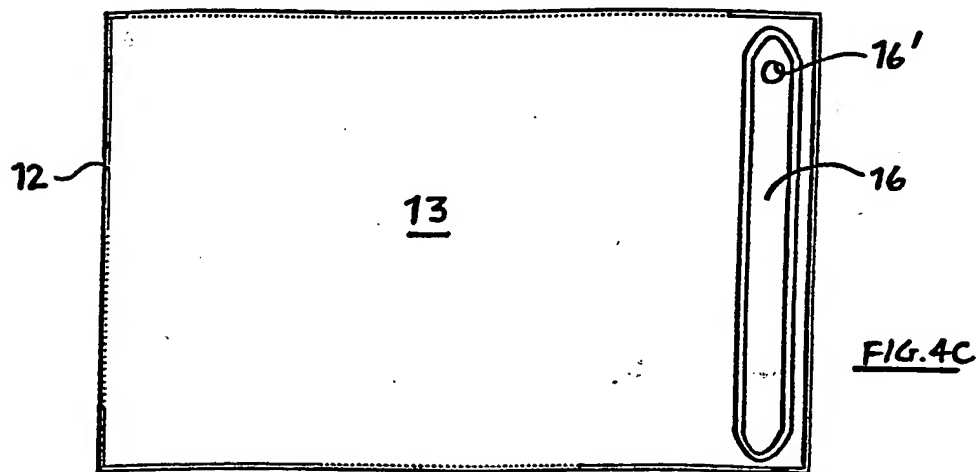
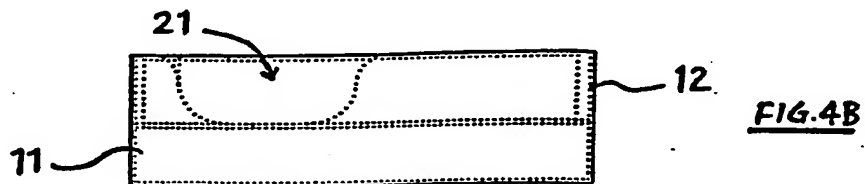
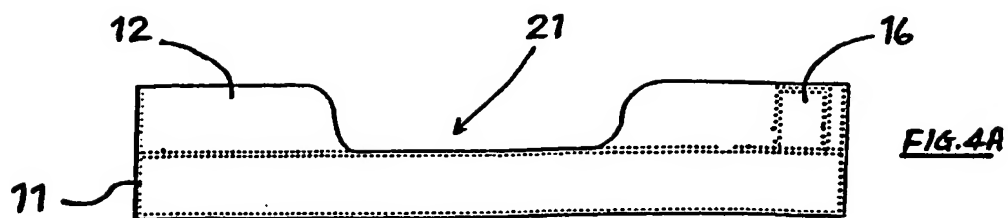
At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

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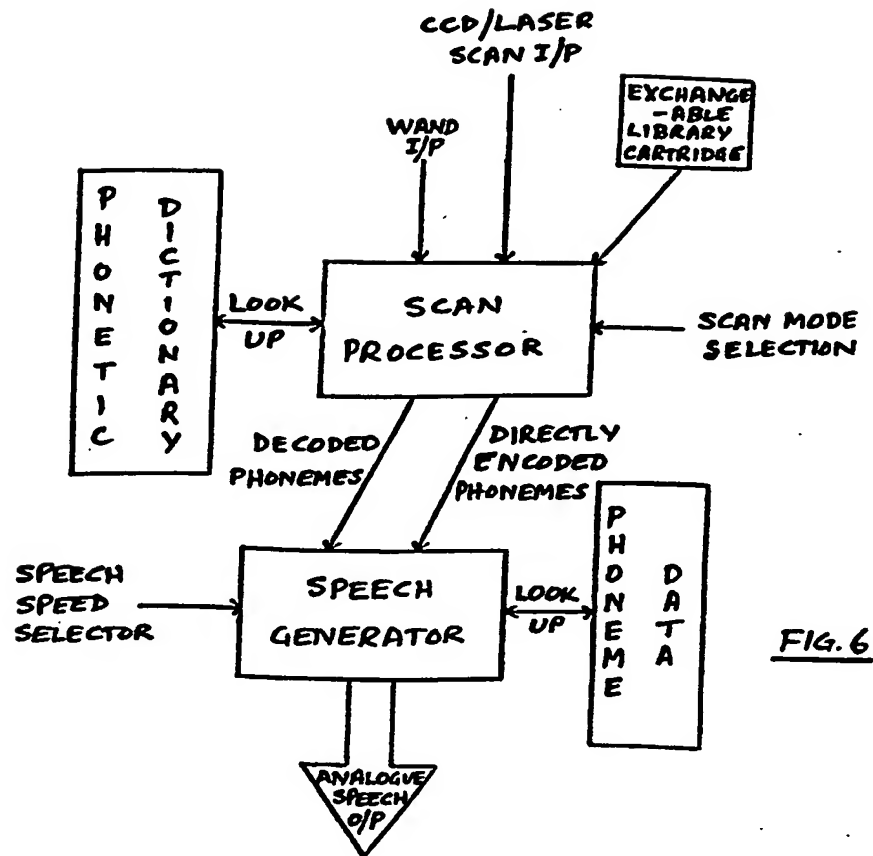


FIG. 6

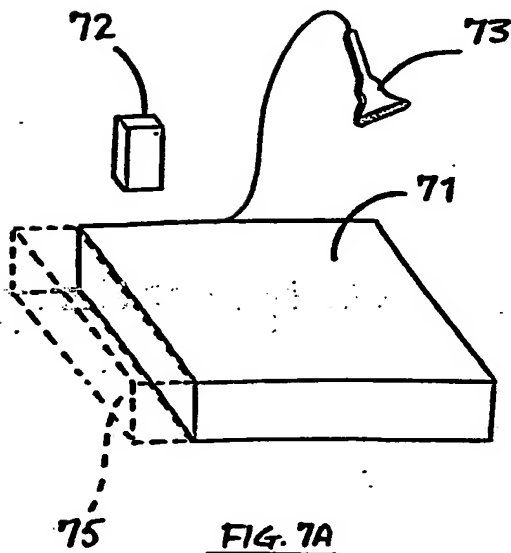


FIG. 7A

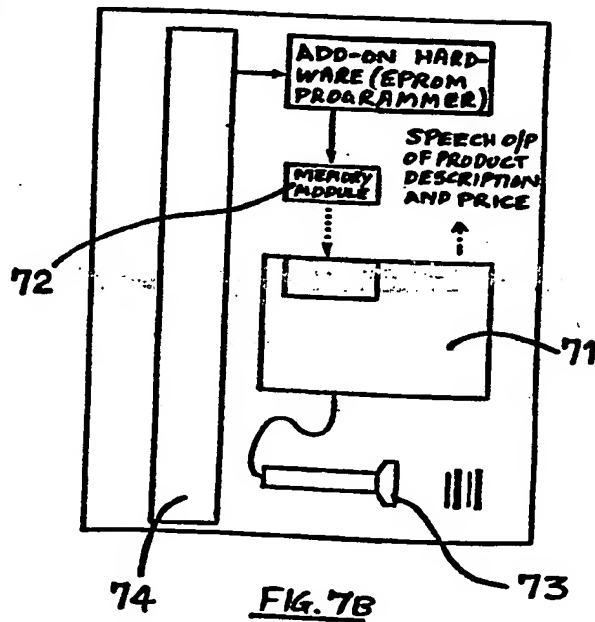


FIG. 7B

SPEECH GENERATION

DESCRIPTION

5 This invention relates to speech generation and concerns, in particular, the use of bar codes to store coded speech signals and the provision of equipment enabling such bar codes to be scanned and converted into an audible output sounding like ordinary speech.

10

 In the Specification of my Application for Letters Patent No. 2184588, there is disclosed the idea of a reading device, primarily for the visually handicapped, incorporating means whereby bar codes representing speech in a coded form can be scanned and read by a hand-held scanning device, with the so-generated signals then being converted into a reasonable facsimile of actual speech. In essence, the bar-code-to-speech conversion unit there disclosed comprises a pen-like bar code reader/scanner, with its electronics, and a document- holding base for supporting the sheet on which are marked aligned strips of bar codes. It is observed that there may also be provided guide means to help those who might otherwise have difficulty in "swiping" the reader/scanner over the bar code strips and, although it mentions the possibility of a slotted template overlying the code sheet, no details of this are given. It has become apparent that the implementation of this earlier invention is rather difficult without knowing in more detail how the reader/scanner is to be positionally controlled as it scans the bar code strips.

30

35 The present invention seeks to deal with that problem, amongst others, and proposes a unit wherein

there is a bar-code-supporting base in the form of a shallow tray-like box including a recess into which may be stored the pen and its physical linking means when not in use and pen guide means in the form of a sheet-like panel mountable removably on the base over a suitably positioned bar code sheet, and bearing a multiplicity of elongate slots which are, in use, aligned with and extend along the corresponding bar code sheet code strips and which provide a mechanical guide for the pen as it is swiped across the bar code strips.

In one aspect, therefore, this invention provides a bar code to speech conversion unit comprising:

a pen-like bar code reader/scanner, together with its associated code reading electronics/mechanism;

a shallow tray-like, box-type base to which the reader/scanner is operably linked, which is arranged to support a sheet carrying thereon aligned strips of bar codes and which incorporates the electronics/mechanism for the reader/scanner and the code-to-speech conversion and includes a recess for storing the reader/scanner and its physical linking means; and

reader/scanner guide means mountable removably over a bar code sheet when positioned on the base, the guide means being in the form of a template and comprising a sheet-like panel bearing a multiplicity of elongate slots which are, in use, aligned with and extend along the corresponding bar code sheet code strips and which provide a mechanical guide for the reader/scanner as, in use, it reads/scans the bar code strips therethrough.

The bar-code-to-speech conversion unit of the invention, for convenience, referred to hereinafter simply as "the conversion unit", is primarily intended to be an aid to those who are blind or partially sighted and cannot read or have great difficulty in so doing. In this context, the idea is quite simply that reading material be provided in the form of that material as spoken, the speech being encoded, in any convenient way, as strips of bar codes, rather than in ordinary alphanumeric form, and that the user have a conversion unit on to which the reading material can be mounted and then "read" using the conversion unit, that is to say, using the unit's pen-like reader/scanner to scan the bar codes and input the coded speech information derived therefrom to a processor device which, in the appropriate way, converts it into and outputs it through a speaker as actual speech. This is explained at some length in the Specification of my aforementioned Application No. 2184588, and it does not need to be repeated here, although hereinafter a little is said about the techniques of coding speech into a form which can then be employed to drive an electronic synthesizer capable of generating completely synthetic but reasonably natural speech-like output.

The bar code itself may be of any suitable type, and may include any appropriate pen speed and data error checking arrangements, although, again, no more need be said about that here.

The conversion unit of the invention includes a pen-like bar code reader/scanner, together with its associated code reading electronics/mechanism. This pen-like reader/scanner device may operate in any way - for example, it may involve a magnetically-sensitive

system and read the magnetic nature of the bars across which it is swiped but, preferably, it employs an optical detection system, such as, a light which shines on to the scanned sheet, and a detector which measures the light reflected back, namely, a lot from a white area and only a little from a black bar. These are well-known techniques, and, once again, no more need be said about that here.

10 The pen-like reader/scanner is linked operably to a shallow tray-like, box-type base for supporting a bar- code-carrying sheet. This link is of course a data link, for the reader/scanner output to be fed to decoding apparatus and the like but it may also be a
15 physical link, such as a spring-coiled cable as used with modern telephone handsets. Alternatively, the link may be a radio, infrared or optical link. Where the link is a physical one, the base includes a recess, either as an actual hole extending from the
20 bar-code-sheet mounting surface, namely, its front surface, down into the body of the base or as a walled area, with walls upstanding from the base front surface, defining a "container" portion. It is in this recess that there may be stored the
25 reader/scanner and, especially, its physical linking means.

Also, a lid for the base may be provided, so that the contents of the unit can be stored therein for
30 ease of carrying, in a similar manner to a small briefcase. Further, the reader/scanner recess may be provided with a lip extending at least partially around the upper periphery thereof, whereby a lead for a speech output headphone can be wrapped securely
35 around the recess wall beneath the lip, with the headphone also being stored in the recess when not in

use.

The invention's conversion unit has reader/scanner guide means. This means is mountable
5 removably on the base over a bar code sheet when positioned thereon and takes the form of a template, in this case, a sheet-like panel, of some fairly stiff material and having an appreciable thickness, in which
10 there is formed a multiplicity of elongate slots which are, in use, and when the guide is mounted on the base, with a bar-code sheet thereunder, aligned with and extend along the corresponding bar code strips. These slots provide a mechanical guide for the reader/scanner as, in use, it reads/scans the bar code
15 strips therethrough.

In a preferred embodiment, discussed further hereinafter with reference to the accompanying drawings, the guide means is a slotted plate with a
20 handle extension on one edge, looking at it with the slots running in a horizontal direction, and the base is tray-like, in that it has low upstanding walls around its periphery, these walls acting as locating means for the guide plate with the relevant right-hand
25 wall having a missing length, or gap, long enough to accommodate the plate's handle extension. The handle extension may be used for carrying the unit, particularly when the latter is provided with a lid such that the handle extension protrudes therethrough.

30

In use, with a bar code strip sheet positioned on the base underneath the slotted guide means, the tip of the pen-like reader/scanner is inserted into each slot in turn into operative "contact" with the bar
35 code strip thereunder and swiped along that strip with the slot acting as a mechanical guide. With the guide

means accurately located on top of the bar code sheet, and utilising the slots, one by one, to guide the "pen" in its swipe from side to side along each code strip, it is remarkably easy and simple for even a totally blind person and, as may often be the case, even such a person with severe arthritis, and the loss of free movement and control of the hands, accurately to swipe each strip and achieve a meaningful speech output from the unit.

10

The slotted guide means or template may be generally symmetrical, so that it can be placed in any one of four orientations with respect to the bar code strip sheet, with the handle extension associated with one wall of the base in two of those orientations and with an opposed wall in the other two orientations. This facilitates use by both left and right-handed people.

20

The invention's conversion unit as so far described is principally for the blind and poorly sighted, enabling them to enjoy "reading" a "book". However, there are many other instances of bar codes in the modern world for almost every product available in the shops has such a code printed either on it or on a label associated with it and it would be highly desirable, were a blind or partially sighted person able to read such codes, that such an ability would go a long way to helping such persons to shop in supermarkets, for example. The problem is how to code each article which it effectively tells the "reader" what it is and yet is not entirely covered in bar codes. One possible answer, proposed by the present invention, is first to ensure that, as is already partly the case, the supermarket's own check-out computer system has a full description of the goods

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indexed under the relevant bar code and second to provide each conversion unit with the means to hold, possibly by way of a download, all the descriptions, indexed to their bar codes, and to enable the unit to
5 output in speech form that description when triggered by the unit's reader/scanner reading the goods' bar code. There is an international system for the bar coding of goods and the computer stores a description of the goods alongside the bar code and can output
10 that description when supplied with the code.

In a second aspect, therefore, the invention provides a bar-code-to-speech conversion unit suitable for use during a visit to or contact with a shop or
15 other undertaking to identify the undertaking's products including any services, the conversion unit comprising:

a bar code reader/scanner, together with its
20 associated code reading electronics/mechanism;

a base unit to which the reader/scanner is operably linked and which incorporates the electronic/mechanism for the code-to-speech
25 conversion;

means arranged to store data relating to product descriptions indexed by bar code;

30 means arranged to convert such description data into speech and to output that speech to a user; and

means arranged to transfer to said data storage means information regarding the descriptions employed
35 by the undertaking presently visited/contacted by a user;

whereby, in operation, upon entry of the user into a shop or other undertaking, the information describing the undertaking's products is stored in said data storage means and, thereafter, the user scans the bar code associated with each product of likely interest, the conversion unit then outputting the relevant description in speech form, enabling the user to identify that product.

10

The shop or other undertaking can be any type of undertaking and may be truly commercial, in the sense that it sells its customers goods or services, or may be more like a public service, such as a library, with each book having a bar code telling the user what it is, who the author is, and what it is about, or a "Job Shop".

The second aspect of the invention's bar code reader/scanner may be a pen-type system, as mentioned above, but it could be more convenient to employ a hand-held scanning laser arrangement as already commonly found in shops, such as, Boots.

The electronics in the base will be much the same as discussed hereinbefore.

The unit includes means for transferring to the data storage means information regarding the descriptions employed by the undertaking being visited/ contacted by the user. This is most preferably a plug-on device either itself holding that data or usable as an interface between the undertaking's computer and the invention's unit, and is supplied by the undertaking to the user upon entering the premises, to enable the user then to

access or download the relevant information.

The means for storing data relating to product descriptions indexed by bar code may take any suitable form and a replaceable RAM or "flash memory" pack/module will typically be most convenient. The data stored may be the full data downloaded to the unit, that is to say, a complete description of all the products available in the undertaking, coded into the form of speech signals usable to drive the unit's speech synthesizer. In such a case, the undertaking's computer would need to store its data in an additional format. Alternatively, however, the storage means might be preloaded with information about how to convert the undertaking's computer's "normal" stored product descriptions into signals suitable for driving the synthesizer and the data downloaded would then be only those normal product descriptions.

Obviously, the means for converting product description data into speech and outputting that speech to the user, will depend on the manner in which the data is stored. Basically, however, it will be the conversion means utilised for the invention in its first aspect, modified as appropriate for dealing with the form of the data which it is fed.

Because the unit can have a fairly large tolerance for reading/scanning purposes, the bar code sheets can be facsimiled or photocopied and then read or scanned without loss of integrity. In contrast, many known arrangements for reading/scanning bar codes are of fine tolerance and, as a result, facsimiled or photocopied bar codes lose their integrity as far as subsequent reading or scanning is concerned. Further, the inventive conversion unit can be used for security

purposes, whereby it can read or scan confidential information in bar code form which has been transmitted by facsimile.

5 The unit which is the subject of the invention's second aspect, is preferably a unit according to the invention's first aspect, but clearly it doesn't need to be, unless, of course, the undertaking wishes to supply the user with bar-coded sheet reading material
10 as well as individual products bearing bar codes.

Various embodiments of the invention will now described by way of illustration only and with reference to the accompanying diagrammatic drawings in
15 which:

Figure 1 is a perspective view from above and one end of a first embodiment of conversion unit in accordance with the invention;

20

Figure 2 is the unit of Figure 1 in plan view;

Figure 3 shows a portion of a sheet carrying bar codes and readable by the unit as shown in Figures 1 and 2;
25

Figures 4A, 4B and 4C are respective end, side elevational, and top plan views of a base part of the unit of Figures 1 and 2;

30

Figure 5 is a plan view of a guide means for use with the Figure 4 unit;

Figure 6 is a block schematic form of the electronics used in the unit of Figures 1, 2 and 4;
35 and

Figures 7A and 7B represent a second embodiment of unit of the invention in respective perspective and schematic views.

5 The first embodiment of conversion unit shown Figure 1, comprises a base 11 in the form of a shallow tray with low perimeter walls 12, as best seen in Figures 4A and 4B, defining an enclosed surface 13 on to which may be laid a sheet 31 bearing bar codes, as
10 shown in Figure 3. This Figure is shown and explained in the specification of the aforementioned Patent Application No. 2184588. Attached to the base 11 by a helically wound cable 14 is a light pen reader/scanner 15. In the embodiment shown, the
15 cable 14 debouches from within an inner walled recess or enclosure 16 in which the cable and pen can be stored when not in use. Alternatively, the helically wound cable 14 is substantially retained out of sight through a hole 16' in one end of the recess 16 when
20 the reader/scanner 15 is stored therein. In use of the reader/scanner 15, the cable 14 issues from the hole 16' and when the reader/scanner is replaced in the recess 16, the cable 14 retracts into the body of the base through the hole 16'. The helically wound
25 cable 14 is "locked" in its in use position with the rim of the hole when it has issued from the hole, so that it does not retract during use, unless required. The lead or cable of a headphone (not shown) for outputting the generated speech, as discussed below,
30 can be wrapped around the periphery of the inner walled recess or enclosure 16 which may have a lip (not shown) extending at least partially around the peripheral top edge thereof and outwardly thereof, for retaining the lead or cable securely in place.

35

When the sheet 31 is in place, it is overlaid by

a guide panel 17, which is a template rather like a stencil, with a multiplicity of parallel slots 18 through which can be seen and read by the reader/scanner pen 15 the strips of bar codes 19 on the sheet 31. The guide panel 17 has a side handle 20 which fits neatly into a gap 21 in the relevant wall 12 of the base 11 as shown in Figures 4A and 4B.

The schematic block diagram of Figure 6 speaks for itself, as do the views of the second embodiment of the shown in Figures 7A and 7B, where 71 is the base, 72 is a plug-in memory cartridge, 73 is the scanning reader device, and 74 is an undertaking's plug-in data transfer apparatus for programming the cartridge 72. 75 is an alternative scanning reader device to device 73 and may be attached directly to the base 71, providing "hands-free" use.

It may also be useful to discuss some details of the technical specification preferably employed for the phonetic dictionary data format utilised in the conversion of bar coded speech to actual speech. This employs a particular CODES file, a phonetic dictionary, and a special bar code format.

1) CODES file

The CODES file is a direct access file which contains Word/Address pairs. The address is the pointer to the phonetic library files.

CODES exist only in the originating system, not in the conversion unit of the invention.

CODES contains references for three classes of words -

fixed dictionary words (those which exist within the conversion unit phonetic library)

parts of speech derived from fixed dictionary

words (e.g. POPULATE is in the phonetic library, POPULATION is not), which can be constructed from a root library word and one of a limited number of suffixes (-s, -ed, -ing, -tion, -er, -est)

5 "unknown" words, i.e. words which do not appear in the phonetic library in the conversion unit. These are coded phonetically and stored in the database of the originating system and encoded into documents as phoneme strings.

10 The CODES file indicates which class a word belongs to, so that correct encoding of documents is possible.

2) The Phonetic Dictionary

15 The dictionary is held in the SAY file on the originating system. This file is replicated in EPROM form in the conversion unit, and is therefore fixed in format - no updates are possible other than in exceptional circumstances, since this would involve a
20 mass upgrade of all conversion units. This may be necessary in the early stages of the commercialisation of the invention, when few conversion units have been issued, but not when any significant market penetration has been achieved. If upgrades are
25 undertaken, they can only be in the form of extending the library, otherwise documents produced for the old format will no longer be readable.

 The dictionary consists of a sequence of phoneme strings delimited by hexFF characters. The address
30 retrieved from the CODES file points to the beginning of the string, and phonemes are output to speech until the delimiting character is found. All phoneme strings are rounded up to an even number of characters by appending a hex00 to an odd length string. This
35 allows a one-bit reduction in code length required for an address, which is significant in the context of bar

coding.

The dictionary is optimized by indirection where several words contain the same phoneme string. This is achieved by inserting a hexFD character followed by a two-byte address into the phoneme string, which causes phoneme generation to continue at the specified dictionary address. On encountering the delimiter of the re-directed string, output continues at the character following the re-directed address in the original phoneme string. It is unlikely that more than one level of indirection will be useful or desirable. Re-direction and the resultant address re-assignment is may be accomplished by analysing the occurrence of duplicate phoneme strings in the development database. A 25% saving in space should be possible (duplicate strings greater than three phonemes give a 25% saving using this method, with correspondingly greater savings in longer strings).

3) Bar Code Format

The basic bar code format is designed to allow slow scanner speed while retaining accuracy. This is done by utilising only black bars for information content, and using a fixed width white space which provides a reference value against which the adjacent black bar is measured. Simply, a black bar narrower than the adjacent white is a 0 bit, and a wider black bar is a 1 bit.

Each encoded value is separated from the adjacent code by a wide white space. This allows a partial scan of a line to be decoded correctly by identifying the start of the first complete bar scanned. Only unidirectional scanning will be possible, at least in the initial release.

Encoded data is organised as follows -
any code of length other than 6 bits or bars is

a dictionary address. If one or more "leading zero" - i.e. narrow black bars - is present, it indicates a requirement to append a suffix to the root word, for example:-

- 5 1 bar - plural, add "s"
- 2 bars -add "ed" (pronunciation depends on last letter of root word)
- 3 bars - add "ing"
- 4 bars -add "tion" (if root word ends in
- 10 "t", drop "t" phoneme first)
- 5 bars - add "er"
- 6 bars - add "est"

 a code of 6 bits is a phoneme value. A string of such values is concatenated by the conversion unit, and output as a single "word". Any pauses required are included as the NUL phoneme, value zero. Direct phoneme encoding is implemented in this way, rather than using a "change mode" indicator, so that partial scans can be interpreted correctly.

20 The conversion unit can be coupled to a computer by means of a standard serial interface allowing the unit to output speech converted from suitable data stored in the computer. Such an arrangement can also be used to transfer information from the bar codes read by the reader/scanner of the unit to the computer for, say, storage purposes. Such information may then be transferred back to the unit from the computer, as and when necessary.

30 Also, and with regard to the second embodiment of unit described above in relation to Figures 7A and 7B of the drawings, subsequent identification of individual items purchased by a user from an undertaking, such as, a retail outlet, may be achieved by a two stage labelling procedure, as follows:

(a) A checkout point or counter in a retail outlet is provided with a preprinted bar code and text label sheets which identify items in any suitable manner, preferably in ascending numerical order. The checkout point operator attaches the relevant label to each item as it is registered.

(b) At or remote from the checkout point or counter, a full set of item labels is printed and provided to the purchaser. On arriving home, say, the purchaser can then identify each item by number and apply the detail label before storage, for subsequent identification using the conversion unit.

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CLAIMS

1. A bar code to speech conversion unit comprising:
a pen-like bar code reader/scanner, together
5 with its associated code reading electronics/
mechanism;
a shallow tray-like, box-type base to which
the reader/scanner is operably linked, which is
arranged to support a sheet carrying thereon
10 aligned strips of bar codes and which
incorporates the electronics/mechanism for the
reader/scanner and the code-to-speech conversion
unit and includes a recess for storing the
reader/scanner and its physical linking means;
15 and
reader/scanner guide means mountable
removably over a bar code sheet when positioned
on the base, the guide means being in the form of
a template and comprising a sheet-like panel
20 bearing a multiplicity of elongate slots which
are, in use, aligned with and extend along the
corresponding bar code sheet code strips and
which provide a mechanical guide for the
reader/scanner as, in use, it reads/scans the bar
25 code strips therethrough.
2. A unit according to claim 1, wherein the pen-like
bar code reader/scanner comprises an optical detection
system for reading/scanning bar codes carried on a
30 sheet supported on the unit base.
3. A unit according to claim 1 or 2, wherein the
pen-like reader/scanner is linked operably to the
base.
35
4. A unit according to claim 3, wherein the operable

link between the reader/scanner and the base comprises a data link.

5 5. A unit according to claim 3 or 4, wherein the operable link between the reader/scanner comprises a radio, infrared or optical link.

10 6. A unit according to claim 3, 4 or 5, wherein the operable link also comprises said physical linking means.

15 7. A unit according to any preceding claim, wherein said physical linking means comprises a spring-coiled cable.

20 8. A unit according to any preceding claim, wherein the storage recess for the reader/scanner and said physical linking means comprises a hole extending into the body of the base in which the linking means is retractably received.

25 9. A unit according to any preceding claim, wherein the storage recess also comprises a wall upstanding from the base and defining a "container" portion.

30 10. A unit according to any preceding claim, wherein the storage recess has a lip extending at least partially around the upper periphery thereof, whereby a lead for a speech output headphone can be wrapped securely around the recess wall beneath the lip, with the headphone also being storable in the recess when not in use.

35 11. A unit according to any preceding claim, wherein the reader/scanner guide means comprises a handle extension on one edge thereof, the extension being

accommodatable in a gap in at least one of four upstanding walls which extend around the periphery of the unit base and which act as locating means for said guide means.

5

12. A unit according to any preceding claim including a lid for the base.

10 13. A unit according to claim 12 when dependent upon claim 11, wherein the handle extension protrudes through the lid, when fitted to the base, for carrying purposes.

15 14. A unit according to claim 11, 12 or 13, wherein the template of said reader/scanner guide means can be placed in any one of four orientations with respect to the base and an associated bar code strip sheet supported thereon, with the handle extension associated with one base wall in two of those
20 orientations and with an opposed wall in the other two orientations, to facilitate use of the unit by both left- and right-handed users.

25 15. A bar code to speech conversion unit substantially as hereinbefore described with reference to the accompanying drawings.

30 16. A bar-code-to-speech conversion unit suitable for use during a visit to or contact with a shop or other undertaking to identify the undertaking's products including any services, the unit comprising:

a bar code reader/scanner, together with its associated code reading electronics/mechanism;

35 a base unit to which the reader/scanner is operably linked and which incorporates the electronic/mechanism for the code-to-speech

conversion;

means arranged to store data relating to product descriptions indexed by bar code;

5 means arranged to convert such description data into speech and to output that speech to a user; and

10 means arranged to transfer to said data storage means information regarding the descriptions employed by the undertaking presently visited/contacted by a user;

15 whereby, in operation, upon entry of the user into a shop or other undertaking, the information describing the undertaking's products is stored in said data storage means and, thereafter, the user scans the bar code associated with each product of likely interest, the conversion unit then outputting the relevant description in speech form, enabling the user to identify that product.

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17. A unit according to claim 16, wherein the bar code reader/scanner is a pen-like bar code reader/scanner.

25 18. A unit according to claim 16, wherein the bar code reader/scanner is a hand-held laser scanner.

30 19. A unit according to claim 16, 17 or 18, wherein said data storage transfer means comprises a plug-on device either holding the data itself or usable as an interface between the undertaking's computer and the unit.

35 20. A unit according to any of claims 16 to 19, wherein said data storage means comprises a replaceable RAM or "flash memory" pack/module.

21. A bar code to speech conversion unit suitable for
use during a visit to or contact with a shop or other
undertaking to identify the undertaking's products
including any services, substantially as hereinbefore
5 described with reference to the accompanying drawings.

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Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number

GB 9225401.0

Relevant Technical fields

(i) UK CI (Edition L) G5G (G6, G13, G17)

(ii) Int CI (Edition 5) G09B

Search Examiner

R A H CASLING

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

24 MARCH 1993

Documents considered relevant following a search in respect of claims 1 TO 15

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
Y/A	GB 2184588 A (BAIL) - see whole document	Claims 1, 2,3 and 6
Y	GB 2029775 A (TAKHVAR) - see page 2 line 48 et seq	Claims 1, 2,3 and 6
Y	US 4838791 (BOGUSIAN) - see page 2 line 50 et seq	Claims 1, 2,3 and 6

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).